

# ORNL Interests and Plans for eRD112 FY23

Mathieu Benoit, Friederike Bock, Oskar  
Hartbrich, Constantin Loizides, Ken Read,  
Nico Schmidt

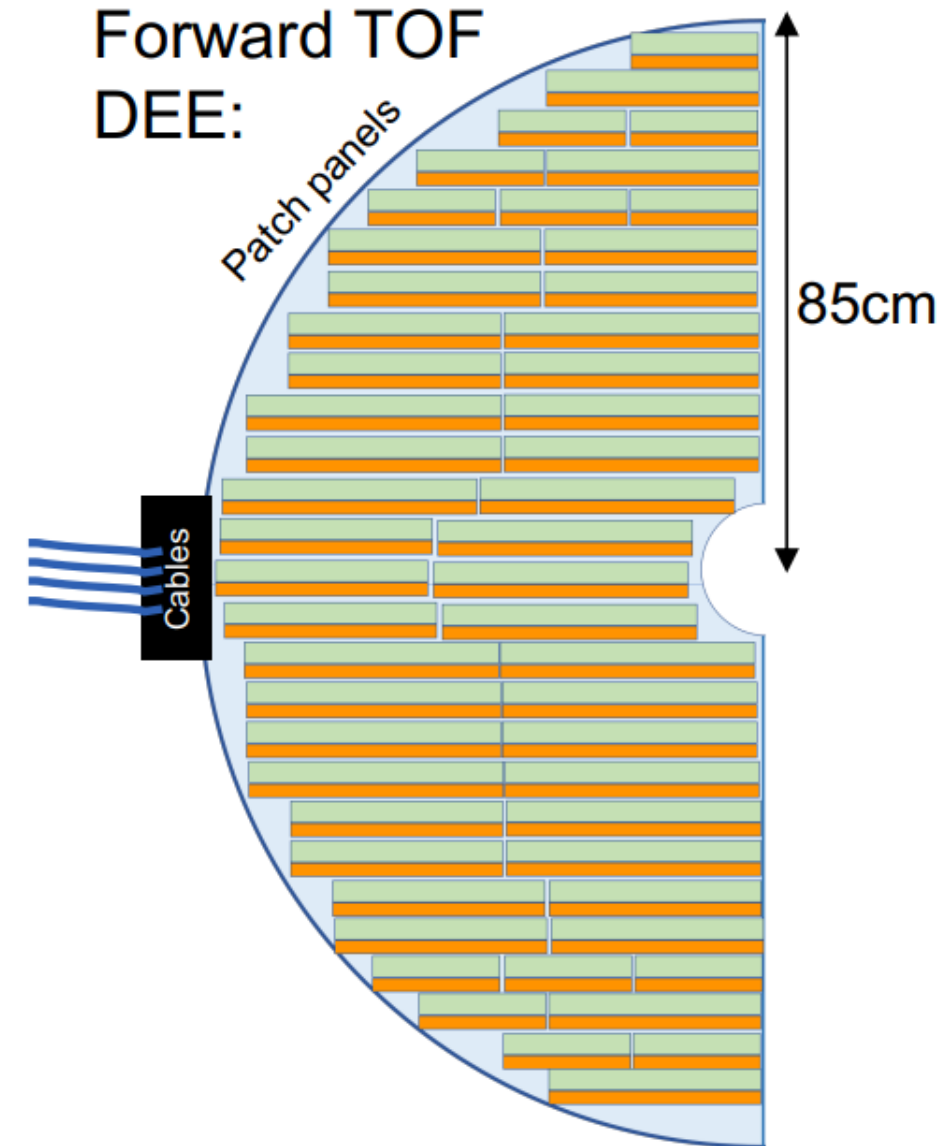
ORNL is managed by UT-Battelle LLC for the US Department of Energy



U.S. DEPARTMENT OF  
**ENERGY**

# Construction/Mechanics of EPIC TOF System

- Some conceptual endcap studies presented by Wei Li on Monday
  - Will need more details towards realistic model for (pre-)TDR
- Barrel details largely undefined so far
  - Athena/ECCE sensor layouts available as starting point
- Engineers from ORNL Nuclear Fusion Division available to Physics Division
  - FEA analyses for loads, deformation etc.



# Services & Cooling of EPIC TOF System

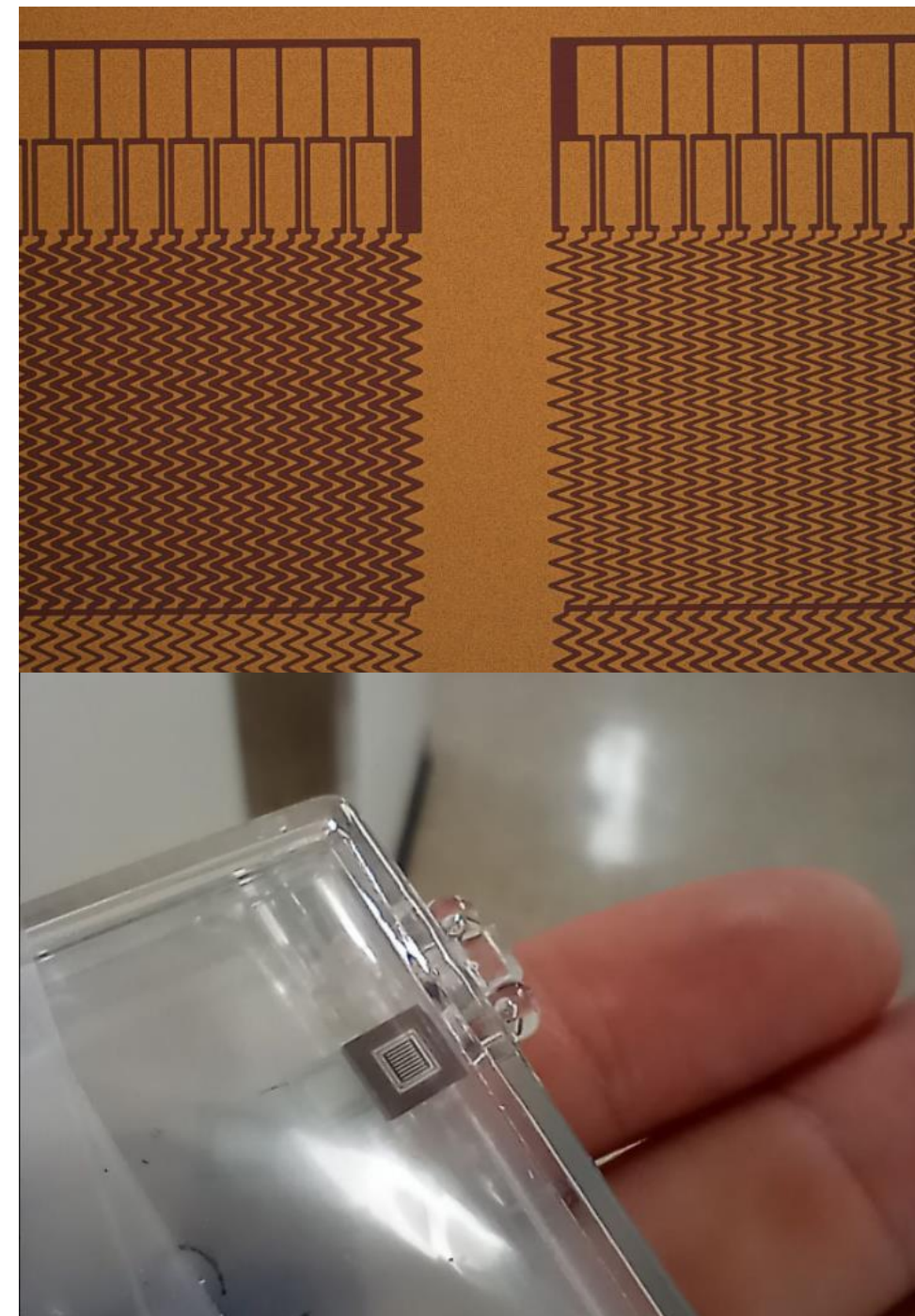
- Combination of Mechanical and Electrical Engineering
- Detailed power dissipation models and studies
  - Ideally parametric model, adaptable to changing design parameters





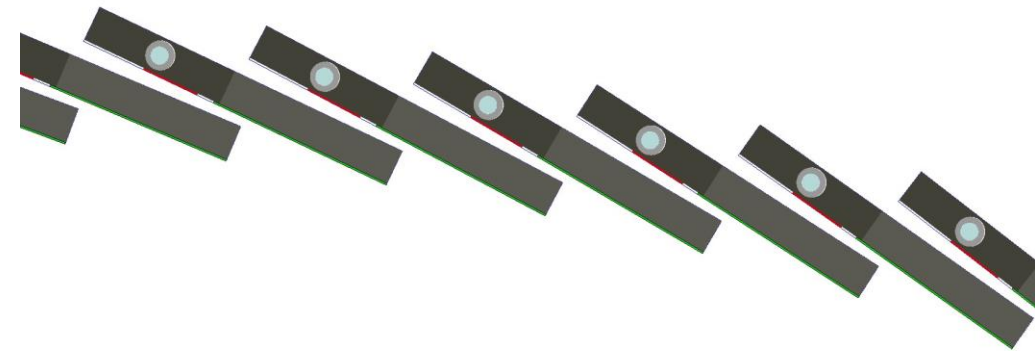
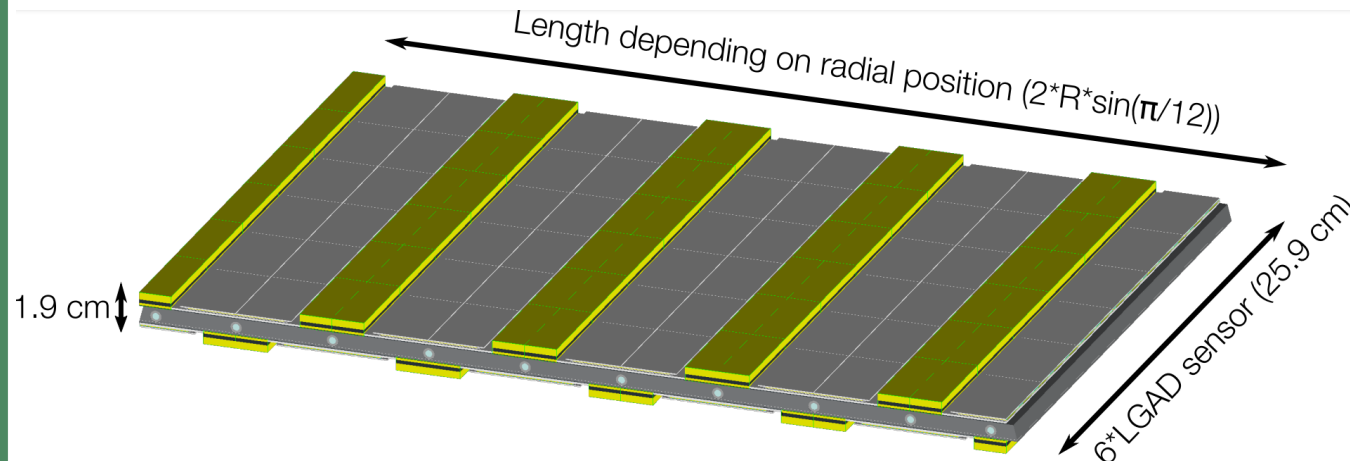
# AC-LGAD Testbeams and Analysis

- Hope to participate in testbeam campaigns, analysis in FY23
  - Starting (re)analysis of “zigzag electrode” sensors with A. Kiselev, J. Ott
- Have BNL sensor prototypes at ORNL
  - Building up infrastructure for true sensor characterization
- Mathieu Benoit will join ORNL Physics Division in October
  - Brings great expertise in fast timing silicon sensors, TCAD, Allpix2 etc...



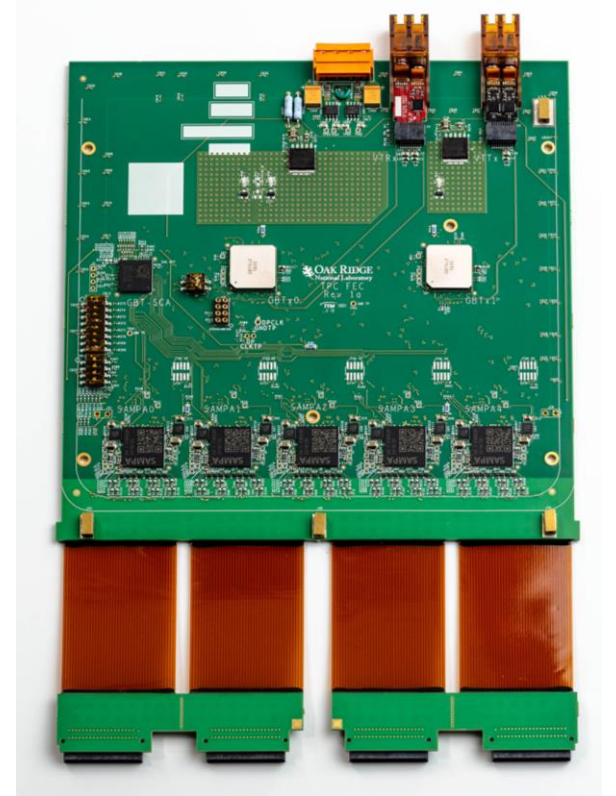
# EPIC TOF Simulation/Optimization/Analysis

- ORNL leads EIC TOF simulation efforts since day one
- Available expertise in simulation, digitization, reconstruction, analysis
  - Could start to implement full readout chain digitization soon



# Electronics and Module Integration

- Start designing actual readout modules and service hybrids?
  - ORNL very successfully developed and installed the ALICE TPC upgrade readout electronics
- Start planning for sensor bonding and module assembly?
  - ORNL will be involved in CMS ETL bonding and module qualification
- Relevant for FY23 already?
  - Never too early for system aspects!



# Summary

- Mechanical engineering: construction of TOF system
  - Mechanical/electrical: cooling/services for TOF
  - Some materials for mockups
- AC-LGAD testbeam participation:
  - 2 people \* 2 testbeams in FY23
  - Data analysis
- EPIC TOF simulation implementation/optimization/analysis
  - 20% postdoc FTE, 10% staff FTE
- Initial design work on service hybrid concepts + readout boards



# The Road Ahead...

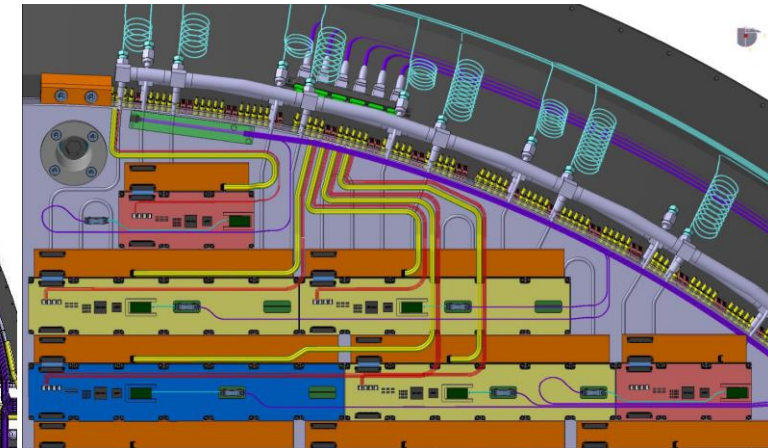
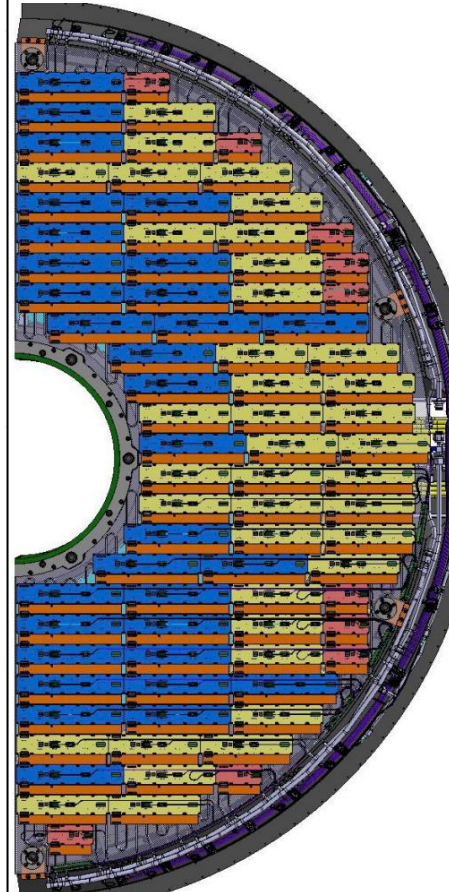
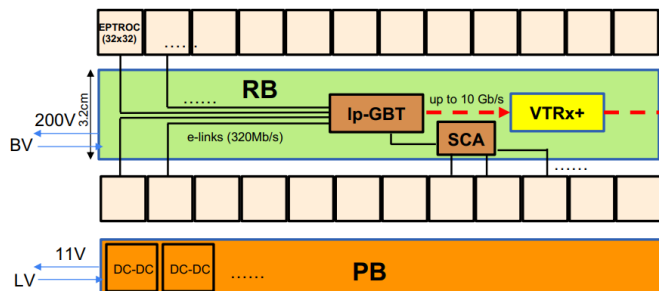
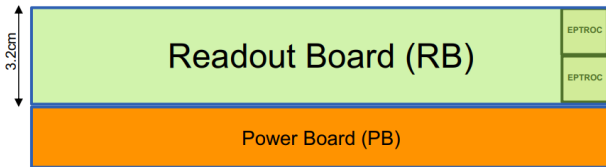
## EPIC TTL

## CMS ETL

Forward TOF  
DEE:

Patch panels

Cables



- 1: Flipped module
- 2: Readout board
- 3: Board-to-board connector
- 4: Connector to powerboard
- 5: BV connector
- 6: GBT-SCA
- 7: IpGBT
- 8: VTRx+

